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Mamea americana L. Mamey, Mammee-apple

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Guttiferae Mangosteen family

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Mammea americana L., commonly known as mamey or mammee-apple (14), is grown throughout the Tropics of the New World for its richly flavored fruit. The tree also makes a handsome ornamental (fig. 1) and produces a hard and beautiful wood.

HABITAT

Native Range

The native range of mamey extends from about 20° to 12° N. across the West Indies (fig. 2). When Columbus arrived it apparently grew in Jamaica (1), Hispaniola (13), Puerto Rico (14), and the Lesser Antilles (21). The species probably originated on one of these islands and was transported to other islands in prehistoric times by the Arawak and other native peoples to whom it was an important food item (5). It is now common in semicultivation in Cuba, Central America, and northern South America (16, 19, 20, 22) and is grown as a fruit tree in many other moist, tropical areas of the world.

Climate

Mamey grows best in moist to wet climates. The species in Puerto Rico grows well in areas where the mean annual precipitation ranges from 1500 to 3000 mm. It is found on the island of Martinique in areas where the annual precipitation ranges from 2000 to 4000 mm (21). In Puerto Rico the wet season extends from May through November and is followed by a somewhat drier season that extends from December through April. Rainfall can exceed 50 mm even in the driest months of the year. The mean monthly temperatures of the coldest and warmest months in Puerto Rico, which are probably representative of the species' natural range, are 27 and 30 °C, respectively. The mean daily temperature fluctuation is about 8 °C. Frosts do not occur in the natural range of mamey. Humidity is usually around 80 percent, and wind speeds are generally low (6).

Soils and Topography

Mamey grows best in deep, rich soils (4, 21). In Jamaica, it is most common in areas of limestone parent material (1); in Puerto Rico it can be found in areas where soils are

derived from sedimentary and igneous rocks. The species even grows in soils derived from serpentine rocks. Sandy loams to clay soils and a range in pH from 5.1 to 7.8 are tolerated (2). Mamey does not seem to grow on excessively drained sands or poorly drained soils. It will survive and grow slowly on eroded and compacted soils. Mamey grows from near sea level to an elevation of 1,600 m in Mexico and Colombia (2, 16).

Associated Forest Cover

Today, even within its natural range, mamey is most frequently found in semicultivation or in areas that have



Figure 1.—Mamey (*Mammea americana*) tree growing in Puerto Rico.

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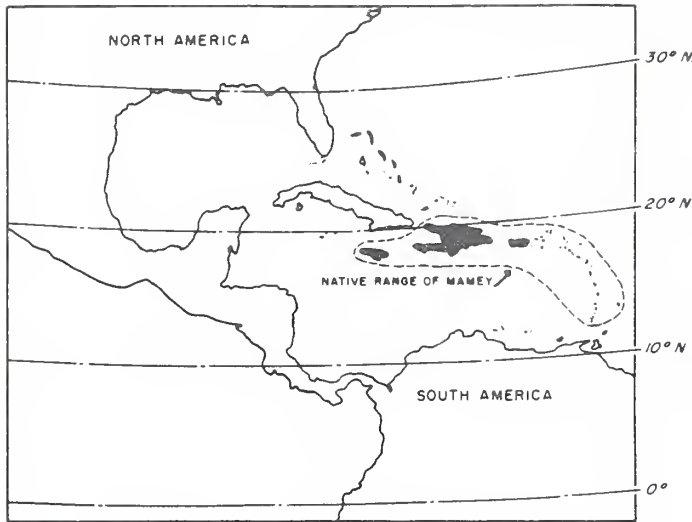


Figure 2.—Native range of mamey (*Mammea americana*).

been disturbed by people. Consequently, in Puerto Rico it is frequently associated with a mix of exotic and aggressive native secondary species such as: *Mangifera indica* L., *Spathodea campanulata* Beauv., *Artocarpus altilis* (Parkinson) Fosberg, *Citrus paradisi* Macfadyen, *Syzygium jambos* (L.) Alston, *Thespesia grandiflora* DC., *Citharexylum fruticosum* L., *Calophyllum brasiliense* Camb., and *Andira inermis* (W. Wright) H.B.K. (author, personal observation).

LIFE HISTORY

Reproduction and Early Growth

Flowering and Fruiting.—The fragrant, white flowers, 2- to 3-cm across, may be staminate, pistillate, or polygamous (14). They grow either as solitary flowers or in clusters on the axils of young branches (16). In the West Indies, flowering occurs from May to October, but the fruit takes over a year to mature (12). The fruits are round, 8 to 15 cm in diameter (fig. 3, 4), and may weigh from 0.5 to 2.0 kg, maturing from July to February (12). Embedded in the firm orange pulp are one to four large seeds (14).

Seed Production and Dissemination.—A sample of 31 seeds from several areas in Puerto Rico averaged 2.0 ± 0.13 seeds per fruit, and the average mass of one air-dry seed was 73.3 ± 4.1 g (author, personal observation). After the fruit falls, it rots, and the seeds are released. Seeds are most effectively transported when humans harvest the fruits. Consumption of the fruits and transport of seeds by domestic and wild animals are probable but undocumented. The seeds are not eaten by livestock and are highly toxic to fish and chickens (14) and probably to other animals and humans.

Young mamey trees begin flowering and bearing fruit when they are between 8 and 13 years old, and fruiting is fairly consistent from year to year. Annual fruit production of mamey in commercial orchards of Mexico frequently averages more than 100 kg per tree (2). A wild tree may produce from a few to perhaps 200 seeds each year. Seeds for

planting are easily collected from mature fruits that have fallen to the ground and can be stored for up to 4 months under refrigeration (11).

Seedling Development.—Mamey seeds germinate hypogeally from 1 to 4 months after planting. A 97-percent germination was obtained from a sample of 31 seeds planted in loam soil (author, personal observation). Germination proceeds normally when the seeds are buried halfway into the soil. The radical emerges from one end of the seed and grows downward to develop a many-branched root system; then a shoot develops and elongates 15 to 20 cm before producing two adultlike leaves.

Although many seedlings transplant well, the best method of nursery production may be to plant seeds directly into nursery bags filled with mixed potting media. Grown under light shade, the seedlings should reach a height of 40 or 50 cm and be ready to outplant 3 to 5 months after emergence. Bare-root planting has been successful for a few seedlings, but has not been systematically tested. A spacing of 10 m is recommended if fruit is going to be cultured (17); closer spacing would be desirable for wood production. A plantation of mamey of about 4.5 ha was established in the moist limestone hills of Puerto Rico by direct seeding in a failing plantation of another species. Survival was about 60 percent after 21 months. The trees were healthy and averaged 76 cm tall. At 5.5 years, heights of the majority of the trees ranged from 2.4 to 3.7 m. After that, part of the plantation was destroyed, and the rest was suppressed by fast-growing secondary species.

Vegetative Reproduction.—Mamey coppices well. When three methods of grafting were compared, 56 percent of the side grafting attempts were successful, 36 percent of the patch grafting attempts were successful, and tip grafting failed (3). It is possible to produce fruit from grafts in 4 or 5 years (2).

Sapling and Pole Stage to Maturity

Growth and Yield.—Mamey is not known to occur naturally in pure stands, and no plantations of merchantable age have been reported. Although individual trees may occasionally reach a 25-m height (12) and a 1.2-m diameter at



Figure 3.—Leaves and fruit of mamey (*Mammea americana*).

breast height (d.b.h.), trees in fencerows and farmsteads normally reach heights of 12 to 20 m and seldom exceed 70 cm in d.b.h. (4, 16, 22). This height is reached in 30 to 40 years, after which there is little height growth. Diameter growth during the first 20 or 30 years is about 1 cm/yr; after this the growth gradually decreases. Mamey may live 100 years or more. The boles of this species are normally straight, but due to branching, usually only a 2- or 3-m merchantable log is produced per tree. Yield data are not available.

Rooting Habit.—Seedlings produce a many-branched lateral root system with no well-defined taproot. Little or no buttressing is evident in older trees. The large, spreading lateral roots of older trees in clayey soils push to the surface and could damage sidewalks and curbs.

Reaction to Competition.—Mamey is shade tolerant. Seedlings may survive for several years in dense shade. Older trees survive for long periods in intermediate crown positions among secondary species. Slow growth and short stature put mamey at a competitive disadvantage with weeds early in life and secondary tree species later. Lacking an effective seed transport system, few mamey become established in forests. However, because of forest destruction and seed transport by humans, the species frequently grows to maturity near dwellings, along fencerows, and on abandoned farmland.

Damaging Agents.—A number of insect pests have been identified feeding on mamey leaves and fruit (18), but none seems to be a serious threat to individual trees. Black mildew, *Aulographum melioloides* Cke. & Mass., and other fungal diseases occasionally attack the leaves (26). Wet-wood termites consume dead branches and trunks of dead trees (18), and the wood is very susceptible to damage by dry-wood termites. Mamey wood is moderately durable in contact with the ground (15). Some of the large, old trees in Puerto Rico suffer from heartrot that has entered through basal scars. The species is resistant to wind damage (24).

SPECIAL USES

Mamey is planted principally for its fruit, which has a firm orange flesh within a brown leathery rind. The flavor has been likened to that of apricot (4). It is eaten fresh and made into preserves (23, 25). All parts of mamey have insecticidal properties and could be detrimental to health if eaten in large and regular amounts (17). A liquor called "l'eau de creole" is distilled from fermented flowers (21). Mamey has dark-green, shiny leaves and dense foliage and is frequently planted for its ornamental value around homes, in parks, and along roadsides (12, 24).

Infusions of the powdered seeds and gum from the bark and green fruit rind were once used a great deal as insecticides to kill ticks and chiggers in domestic animals and people (16, 22). Uses of mamey in folk medicine have included treatment of scalp infections, diarrhea, and digestive and eye problems (19). Mamein and related coumarins have been investigated for possible pharmacological activity (8, 9).

Mamey heartwood is reddish brown, and the sapwood is slightly lighter colored. The wood is hard, heavy, and strong, with a specific gravity reported as 0.865 g/cm³ when air dry (15) or 0.980 g/cm³ with an unspecified moisture

content (10). The wood seasons slowly and suffers considerable degrade in the process. In a Puerto Rican test of air-drying, 50 percent of the volume was lost through seasoning defects (14). Mamey wood shrinks 5.4 percent radially, 12.1 percent tangentially, and 0.38 percent longitudinally. It machines easily (10), but the lack of stability after manufacture makes it unsuitable for use in furniture (15). Although available only in limited quantities, mamey wood is used for trim, novelties, and turnery, as well as for beams and posts. The wood was once favored locally for pipe poles.

GENETICS

There are four species in the genus *Mammea*, one from tropical America and three from Africa (13). It has been suggested that genetic selection might result in an improvement in fruit quality (4).

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